Petroleum engineering syllabus

Petroleum engineering examinations

Group A - Compulsory examinations (seven required)

17-Pet-A1 Principles of Stratigraphy and Sedimentation

Sedimentary processes, environments and facies; properties and classification of sedimentary rocks; stratigraphic code, nomenclature and the stratigraphic column; stratigraphic relationship and interpretations.

Textbooks (most recent edition is recommended):

Primary Text:

Secondary Text:

17-Pet-A2 Petroleum Reservoir Fluids

Phase behaviour of hydrocarbon fluid ideal and non-ideal gases, and liquids; qualitative and quantitative phase behaviour-PVT data and equations of state; properties of gases, oil, and water; reservoir fluid studies; application of fluid properties for compositional analyses; phase separation and reservoir behaviour; gas-liquid equilibria.

Textbooks (most recent edition is recommended):

Primary Text:

Secondary Text:

17-Pet-A3 Fundamental Reservoir Engineering (Physical Properties and Flow of Fluid through Porous Media)


Textbooks (most recent edition is recommended):

Primary Text:
Secondary Text:

17-Pet-A4 Oil and Gas Well Drilling and Completion

Drilling rig types, components and selection. Rotary drilling, drilling fluids, drilling hydraulics, penetration rates, drilling operations, core and core analyses, drillstem testing, casing design and seat selections; formation damage; cementing procedures, and well completion. Special topics including: directional drilling; blowout control; logging and coring; hole stability; planning and cost control; underbalanced drilling; coiled tubing drilling; offshore drilling operations, and environmental aspects.

**Textbooks (most recent edition is recommended):**

Primary Text:

Secondary Text:

17-Pet-A5 Petroleum Production Operations


**Textbooks (most recent edition is recommended):**

Primary Text:

Secondary Text:

17-Pet-A6 Reservoir Mechanics

Advanced reservoir engineering principles including estimation of reserves; material and volumetric balance; combined driving mechanisms including unsteady state water influx; mechanics in hydraulically fractured wells. Performance prediction techniques. Linear material balance and statistical analysis of unknowns from production history.

**Textbooks (most recent edition is recommended):**
Primary Text:

Secondary Text:

**17-Pet-A7 Secondary and Enhanced Oil Recovery**

The fluid displacement process. Trapping and mobilization of residual oil; displacement theory; linear waterflood calculations; viscous fingering; flood patterns and sweep efficiency. Buckley/Leverett theory. Analytical waterflood prediction models; black-oil reservoir simulation models; design engineering aspects of waterflooding. Miscible displacement methods and thermal recovery techniques.

**Textbooks (most recent edition is recommended):**

Primary Text:

Secondary Text:

**Group B - Optional examinations (two required)**

**17-Pet-B1 Well Logging and Formation Evaluation**

Theory and engineering and applications of measurements of physical properties of the formation near the wellbore; types of well logging devices; conventional logging interpretation and its applications in oil, and gas reservoirs.

**Textbooks (most recent edition is recommended):**

Primary Text:

Secondary Text:
**17-Pet-B2 Natural Gas Engineering**

Estimation of reserves; flow measurements; flow through conduits; steady, transient, Darcy and non-Darcy flow through porous media; well testing, buildup and drawdown tests; deliverability; well interference. Decline curve analysis; and development of shale gas.

*Textbooks (most recent edition is recommended):*

**Primary Text:**

**Secondary Text:**

**17-Pet-B3 Oil and Gas Evaluation and Economics**

Oil and gas reserves, conservation, proration, value of money, evaluation nomenclature, payout time, profit ratio, rate of return, capital cost allowance, taxation, oil and gas utilization theory.

*Textbooks (most recent edition is recommended):*

**Primary Text:**

**Secondary Text:**

**17-Pet-B4 Petroleum Geology**

Physical and chemical characteristics of formation waters, natural gas, and crude oil. Origin and modes of occurrence of each of these in the earth. Geography of petroleum and natural gas in Canada, North America, and the world.

*Textbooks (most recent edition is recommended):*


**17-Pet-B5 Well Testing**

Basics of Well Test Interpretation: diffusivity equation, skin, wellbore storage, radius of investigation; different flow regimes: transient, pseudo-steady state, steady state; interpretation of drawdown and buildup data for estimating formation permeability, skin, reservoir pore volume, average reservoir pressure; superposition; effect of fault and double porosity systems; derivative analysis; gas well testing.

*Textbooks (most recent edition is recommended):*

**Primary Text:**

**Secondary Text:**
• R. C. Earlougher, Advances in Well Test Analysis, SPE Monograph No. 5, 1977.